Software Quality Engineering

Assignment 03

Name : Muhammad Shamoil
Section : BSSE – V – A
Date: 1st November , 2025
Submitted To : Sir Naseer Jan

Contents

Q1. What are different models and frameworks widely used for software product and process evaluation and measurement?

Software quality is assessed using different models and frameworks that help in evaluating both **the product** and **the process**. Some of the most widely used ones are:

1. **ISO/IEC 25010 (Software Product Quality Model):**
   Defines eight main quality attributes—functionality, reliability, usability, efficiency, maintainability, portability, compatibility, and security. It is one of the most recognized standards for product evaluation.
2. **McCall's Quality Model:**
   Focuses on bridging the gap between users and developers by emphasizing operational characteristics like reliability, maintainability, and usability.
3. **Boehm's Quality Model:**
   Extends McCall's work by introducing hierarchical quality characteristics focusing on user experience, human factors, and overall software utility.
4. **ISO/IEC 9126:**
   The earlier version of ISO 25010, which classified software quality into internal, external, and in-use metrics.
5. **CMMI (Capability Maturity Model Integration):**
   A framework that helps organizations measure and improve the maturity of their software development processes across five levels.
6. **Six Sigma:**
   A statistical and data-driven framework used to reduce process variation and eliminate defects, improving software reliability and performance.
7. **SPICE (ISO/IEC 15504):**
   A process assessment model that measures how well software processes are defined and followed in an organization.

Q2. What are the main objectives of different models and frameworks used for software quality evaluation? Highlight key similarities and differences along with examples.

Model/Framework	*Objective*	*Similarities*	*Differences*	*Example*
ISO/IEC 25010	To provide measurable criteria for software quality attributes.	Focus on improving quality through measurable standards.	Focuses purely on product quality.	Used to evaluate performance and usability of an app.
McCall's Model	To connect customer needs with developer performance.	Prioritizes reliability and maintainability.	Less detailed than ISO 25010.	Evaluating maintainability of a university management system.
Boehm's Model	To ensure software utility and human usability.	Includes user-centered aspects.	Focuses more on human factors.	Assessing satisfaction in mobile apps.
CMMI	To assess process maturity and improve development practices.	Promotes standardization and improvement.	Focuses on processes, not product features.	Used in large software companies for process benchmarking.
Six Sigma	To reduce process defects using statistical analysis.	Encourages continuous improvement.	Quantitative approach compared to qualitative models.	Used by IT firms to track defect rates.
SPICE	To measure process capability and performance.	Similar to CMMI in process orientation.	Provides detailed capability levels.	Used for evaluating software teams in organizations.

Similarities:
All aim to improve software quality, reduce defects, and enhance efficiency.

Differences:
Models like ISO/IEC 25010 focus on product quality, while CMMI and SPICE focus on process improvement. Six Sigma is more statistical and measurable, while Boehm's and McCall's emphasize qualitative factors.

Q3. What models and frameworks are most relevant to evaluate quality in bespoke, market-driven, and technology-driven products?

1. **Bespoke Software (Custom-built systems):**
    - Relevant Models: ISO/IEC 25010, McCall's Model
    - Reason: They focus on tailored functionality, maintainability, and reliability — all important for systems made specifically for clients, like internal management software.

2. **Market-driven Software (Commercial products):**
    - Relevant Models: Boehm's Model, Six Sigma
    - Reason: They focus on user satisfaction, usability, and low defect rates, which are crucial for apps or products sold to a wide audience (like mobile or web apps).

3. **Technology-driven Software (AI, IoT, etc.):**
    - Relevant Models: ISO/IEC 25010, SPICE
    - Reason: These handle innovation-focused systems where adaptability, performance, and security are key for evolving technologies.

Q4. What model or framework will you use to evaluate your mobile or laptop? How do you evaluate?

Device: ROG STRIX G15 (Ryzen 7 4800H, 16GB RAM, Windows 11, NVIDIA GTX 1060Ti)
Chosen Framework: ISO/IEC 25010 (used AI to see multiple and select the best)

I chose **ISO/IEC 25010** because it provides a clear and structured way to evaluate both the software and hardware components of my laptop. Since it includes characteristics like usability, performance, and reliability, it perfectly suits my laptop's evaluation.

Evaluation Steps:

1. **Functionality:**
   Tested the laptop for performing heavy programming tasks, running Visual Studio, VS Code, and SFML projects efficiently. The system handles multitasking without performance lag.

2. **Performance Efficiency:**
   Monitored CPU and GPU usage during long coding sessions and gaming using Task Manager and ROG Armoury Crate. The response time remained fast with stable frame rates.

3. **Usability:**
   The RGB keyboard layout, responsive trackpad, and high refresh-rate display improve the overall user experience and comfort.

4. **Reliability:**
   Observed stability during long runtime (4–6 hours of continuous use). The laptop rarely crashes and recovers quickly from sleep mode.

5. **Security:**
   Checked Windows Defender, BIOS protection, and TPM 2.0 encryption support. All were active and stable.

6. **Maintainability:**
   The laptop supports easy driver and BIOS updates through ASUS Armoury Crate. However, fan tuning sometimes requires manual adjustment.

7. **Portability:**
   Though slightly heavy, the laptop connects seamlessly to external devices like projectors, monitors, and Wi-Fi networks without compatibility issues.

Conclusion:
The ROG Strix G15 scores high in performance, usability, and reliability, with minor maintainability issues. Based on ISO/IEC 25010, it maintains excellent product quality suitable for software engineering tasks, gaming, and multitasking.

References

1. https://www.geeksforgeeks.org/software-quality-models/
2. https://www.atlassian.com/continuous-delivery/six-sigma
3. https://www.sei.cmu.edu/cmmi/
4. Chatgpt and Gemini for decision making , and content listing